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Our meridian circle observations of latitude in the interval of 25 years, 1893 to 1918, give the following expression for the latitude variation.

$$\phi - \phi_0 = -0''.14 \cos(t - 1894.27) 300^\circ - 0''.11 \cos(t - 1893.82) 360^\circ$$

The international series of zenith telescope observations during the past thirty years give the following latitude variation, for the position of the Lick Observatory.

$$\phi - \phi_0 = -0''.16 \cos(t - 1894.33) 302^\circ - 0''.08 \cos(t - 1893.84) 360^\circ$$

The last expression derived by Dr. Chandler, published in 1894, reduced to the longitude of the Lick Observatory, follows.

$$\phi - \phi_0 = -0''.16 \cos(t - 1894.30) 310^\circ - 0''.11 \cos(t - 1893.78) 360^\circ$$

The effect of the periodic variation of longitudes would be insensible in meridian circle observations of right ascensions, since the clock corrections are determined with the same level corrections that are used for observations of the stars to be determined. The corrections to the clock at some epochs may be as much as two hundredths of a second in error, as a maximum. In exchanging signals for the differential determination of longitude, the variation would be the same for two stations on the same meridian. Its effect would be small for two stations not far apart, east and west. But for transatlantic exchange of signals, the longitude result might be as much as two hundredths of a second in error, unless allowance were made for the effect of the variation. For two stations on opposite sides of the Earth a maximum error of the double amplitude, or four hundredths of a second, might occur.

July 20, 1921.

PLANETARY PHENOMENA FOR SEPTEMBER AND OCTOBER, 1921.

MALCOLM McNEILL

PHASES OF THE MOON, PACIFIC TIME

New Moon.....	Sept. 1, 7 ^h 33 ^m P.M.	New Moon ..	October 1, 4 ^h 26 ^m A.M.
First Quarter	" 8, 7 30 P.M.	First Quarter. "	8, 12 12 P.M.
Full Moon	" 16, 11 20 P.M.	Full Moon ... "	16, 3 0 P.M.
Last Quarter	" 24, 1 18 P.M.	Last Quarter.. "	23, 8 31 P.M.
		New Moon...	" 30, 3 39 P.M.

There will be a *Total Eclipse of the Sun* on October 1st, but the line of totality is badly situated for observation running from the

region of Cape Horn to a point near the South Pole. It may be seen as a partial eclipse in the central and southern parts of South America.

The fourth and last eclipse of the year will be a *Partial Eclipse of the Moon*, October 16th. The eclipse will be practically over before sunset for the western coast of North America. The beginning will be visible generally in Asia except the eastern portion, Europe, Africa, the eastern part of South America, the Indian Ocean, and the Atlantic Ocean; the ending visible generally in western Asia, Europe, Africa, South America and North America, except the extreme western part. In the maximum, the eclipse will be not quite total.

The Autumnal Equinox is reached September 23rd, 6^h20^mA.M. Pacific Time, the Sun crossing the equator from North to South.

Mercury on September 1st is an evening star having passed superior conjunction on August 23rd. It is now too near the Sun to be seen, but its distance from the Sun is increasing thruout the month and on October 7th it reaches its greatest east elongation, 25°23'. This is larger than the average greatest elongation; but as the planet is 10° south of the Sun the interval between sunset and the setting of the planet is considerably less than an hour, too small for naked eye observation. This is what usually happens for greatest east elongations in the autumn. The distance between Sun and planet then decreases and inferior conjunction is reached on October 31st. *Mercury* is in conjunction on September 6th with *Jupiter* and *Saturn*, but the bodies are too near the Sun for naked eye view on that date.

Venus is a morning star rising a little more than three hours before sunrise on September 1st; this interval diminishes to about two hours by October 31st. Having passed greatest west elongation on July 1st, it is now approaching the Sun, its eastward motion being considerably greater than the Sun's. It moves from *Cancer* thru *Leo* into *Virgo* 71° eastward and 15° southward. On September 24th it passes less than half a degree north of the first magnitude star, *Regulus*, α *Leonis*. It is in conjunction with *Neptune* September 13th, the nearest approach being only 5', with *Mars* on October 3rd, the least distance being 11', with *Saturn* on October 22nd, and with *Jupiter* on October 25th.

Mars is also a morning star, rising an hour and a half before sunrise on September 1st, and three hours before on October 31st. So

it is now far enough away from the Sun for easy observation in the morning twilight. It is in the constellation *Leo* and moves 27° eastward and 14° southward. On September 17th it is in conjunction *Regulus*, α *Leonis*, passing less than 1° north of the star. Its conjunction with *Venus* on October 3rd has already been noted. Its distance from the Earth diminishes 17 millions of miles in the two months, altho it does not reach its aphelion until November. Its brightness has begun to increase a little but hardly enough to be noticed except under careful measurement.

Jupiter and *Saturn* are still evening stars on September 1st, but both are then too near the Sun for naked eye view. They come to conjunction with each other on September 14th, *Jupiter* being about 1° south of *Saturn*; but they are then only about 4° from the Sun, and come to conjunction with that body *Jupiter* at 2 P.M. on September 22nd and *Saturn* at 5 A.M. on September 21st. The planets now become morning stars and not long after October 1st are far enough from the Sun to show themselves in the morning twilight. Both are moving eastward, *Jupiter* east of *Saturn* and gaining on it. At the end of October *Jupiter* is about 4° east of *Saturn* and rises nearly half an hour later. The minor axis of *Saturn's* ring is increasing so that before the end of the two months' period it will be seen easily with a small telescope.

Uranus came to opposition with the Sun on August 31st, and was then above the horizon the entire night. By the end of October it will set at a little after 1 A.M. It remains in the constellation *Aquarius* and moves westward and southward less than 2° . It is still in the neighborhood of the fourth magnitude star, λ *Aquarii*, but is moving away from it so that by the end of October it is 4° west and 2° south of the star.

Neptune passed conjunction with the Sun on August 6th, and is now a morning star in the constellation *Cancer*. It rises before midnight at the end of October.